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Riter-Conley Manufacturing Company

STEEL CONSTRUCTION

Pittsburgh

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THE UNITED GAS IMPROVEMENT COMPANY,

PHILADELPHIA.

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OF

AIR AND STEAM SUPPLY

(PATENTED),

AFFORDING { PERFECT CONTROL OF GENERATOR FIRE CONDITIONS.

PRODUCING { UNIFORM RESULTS. HIGHEST EFFICIENCIES.

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Report of the Committee on Indoor Lighting, N. C. G. A.[1]

[Submitted by MR. SIDNEY MASON, Chairman.]

Progressive gas companies have shown that it is possible to make great gains in residential lighting business by applying aggressive selling methods, embodying the campaign idea in selling smaller units. The installation of a large number of burners, however, is not of more importance than maintaining these burners to give satisfactory service to the customer.

It is usually conceded that little has been done to aid the residential consumer in getting the best service from gas illumination. As the holding of existing business and the expansion of gas lighting largely depends upon maintaining burners in good operating condition, the way to securing this result is of vital interest.

Instruction of the consumer or burner maintenance done for him entails considerable expense. The latter may be gratuitous, each installation being visited at fixed intervals, the labor supplied free and the consumer charged only for the material used, or a definite sum per month or year may be charged, the company maintaining the installation in perfect condition, furnishing all labor and material, and in addition taking care of complaints that may arise between calls of the maintenance men.

Of these methods the first may be made quite effective. The demonstrators now employed to instruct in the use and care of cooking appliances may be trained to give similar instruction in the care of lamps. One good feature is that these demonstrators are generally women and as the care of the gas burners usually devolves upon the women in the house, the fact that a woman can care for lighting appliances should convince them of the ease and simplicity of the operation.

Experience has proven that more is necessary with cooking and heating appliances than the instruction by demonstrators, and we believe that the surest and most effective method is maintenance by the gas company. Men should be utilized for this work, able to perform the more disagreeable operations necessary, and who possess the knack sometimes required to locate troubles in the piping or other parts of the system separate from the lamp.

The best results, however, will be secured by a combination of the two methods; that is, regular inspection by men capable of correcting the more difficult mechanical troubles, and instruction of the consumer in the care of lamps by the demonstrators.

The Consumers Gas Company of Toronto has the following system:

A sufficient number of residence burner maintenance men are provided to cover the entire city three to four times yearly. They carry a supply of mantles, burners, glassware and accessories in a suit-case. When calling they announce that they are sent by the gas company to look over the installation and make (free of charge) any adjustments necessary, to clean burners and to make all ordinary repairs not requiring material. Wherever they find mantles needed, they offer to make the replacement or repair, charging only for the material used. The charge is usually collected by the inspector, but where the customer is entitled to credit, the charge, if requested, is placed upon the gas bill. The cost of this service, deducting the profit on the sales made by the men, is 8¼ cents per call.

In addition to the sales made, the inspectors turn in valuable prospects for fixtures, portables and heating and cooking appliances, so that a large part of the cost might be charged to selling expenses. In addition to the value of this service in immediate sales, the Company gets a large advertising value from the more satisfactory performance of the appliances, and from the appreciation by the public of the service rendered. The Company states that "The thing their people most appreciate is the quality of light which they are able to get. It is a common thing to hear people say 'we did not know that it was possible to get gas lamps that would give so much light.' The men who canvass usually distribute, in the evening, circulars describing the system to the houses which they expect to visit the following day. It is difficult to estimate the amount of appliances sold directly and indirectly by this method, but we have every reason to believe that it has saved thousands of people from going over to other systems of lighting."

An example of the second method, in which maintenance including material and labor is furnished at a fixed charge, is the system operated by the Peoples Gas Light and Coke Company of Chicago. A nominal charge of 10 cents per month per lamp is made covering all renewals, monthly calls and necessary emergency calls. They find that this charge more than covers the expense involved, in

1, Slightly abridged.—EDS.

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maintaining over 36,000 lamps in residences. The great advantage of periodic maintenance over request maintenance lies in the fact that all consumers will not complain to the company, being more apt to complain to their neighbors. That the scope of this system is very restricted is evidenced by the comparatively small number of burners on maintenance—36,000 burners out of those used by 573,000 consumers. However, this is being increased at the rate of 500 contracts a week."

Whichever method is adopted the work must be done carefully and thoroughly. Fixture cocks must be cleaned if there is not sufficient flow; leaky cocks must be ground in and greased; house piping must be blown out; the consumer should be instructed in the handling of the incandescent mantle; the gauze must be carefully cleaned. In putting either of the methods into effect, every installation should be placed in first-class condition before the inauguration of the service.

Undoubtedly a great part of the prejudice against gas lighting may be traced to obsolete appliances and improperly maintained burners, and the elimination of these two disturbing factors will be a most effective advertisement for any gas company. Only a small portion of the public is familiar with the radical improvements made in gas lighting appliances during the last few years, and in spite of the large number of modern self-lighting burners sold, it is still probably true that the great majority of gas users imagine that the only way of lighting a gas lamp is by a match. Furthermore, many gas consumers are not familiar with the advantages of the incandescent burner, their opinion of it being largely based upon the performance of the very earliest burners and mantles.

It is of the utmost importance that the relief offered by modern improvements in gas lighting appliances be shown the public convincingly and continuously. Economy is one of the great advantages of gas, and means should be taken to bring this merit of gas lighting before the public. Economy is important to the majority of the public, and this condition will be accentuated by the constantly increasing cost of living.

The relative economic advantages of gas and electricity over a period of 33 years is graphically shown in Fig. 1.

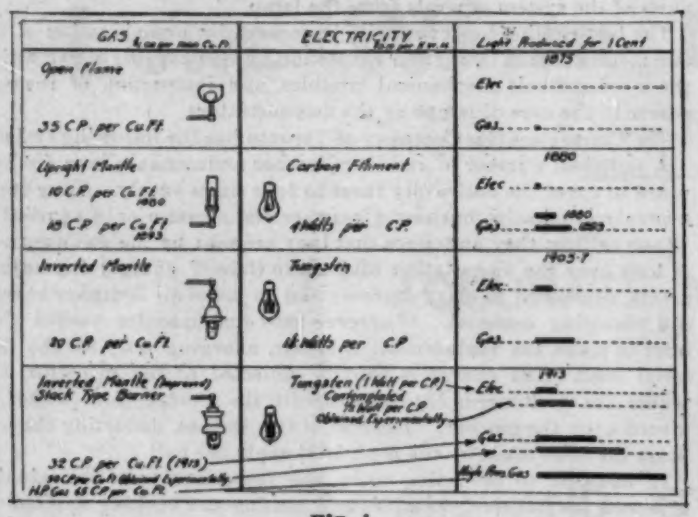


Fig. 1.

While radical changes in electric lighting appliances have been made, there has been no lack of similar development in gas appliances, the most recent of a more radical nature than anything in electric lamps. By taking effective means to bring these facts before the public, and to raise the standard of operation of existing gas appliances by adequate maintenance, gas companies may obtain an increase in the lighting business far beyond expectations. Realization of our present opportunities, however, requires more than simply a greater activity along conventional lines. A large part of our activities must be directed toward replacing the inefficient open flame tip, by appliances giving the consumer greater value for his money and more satisfactory illumination. These thousands of open flame burners might not be serious if there were no competing illuminant available as was the case in 1875. To-day, however, it cannot be regarded as anything but the finest advertisement for competing illuminants. The tendency to base legal requirements on calorific value rather than candle-power makes it advisable to replace them as quickly as possible.

In the sale of gas lighting appliances, there are in general two methods: One, the conventional way by which territory is canvassed by the regular sales force; and the other, the campaign method, the details of which you are all familiar with, and which many gas companies have prosecuted to excellent advantage. Both have a distinct place, and neither can supplant the other.

The campaign is the most effective means of giving publicity to modern methods of gas illumination, but no company should content itself with even the most successful campaign. It should be borne in mind that the business obtained in this way is a comparatively small part of the business obtainable. The territory should also be canvassed by salesmen competent to advise concerning the selection of fixtures, portables, etc.; the systems of lighting to be used under different circumstances, such as indirect and semi-indirect which depend largely upon the color of walls and ceilings; and the many special applications of gas lighting in stores, show windows, etc.

In soliciting lighting, the work of the salesman may be made more effective if he is equipped with attractively bound folders containing photographs of installations, which he may show as examples of satisfactory gas lighting, particularly if they are of local installations to which he can refer the prospective consumer. A number of such installations are reproduced herewith.

Fig. 2 shows the illumination of a store in which fine china-

Fig. 2.

ware is displayed. The lighting is by simple, inexpensive, but very attractive semi-indirect units, and is not only pleasing by reason of its novelty, but the illumination is soft, well diffused and ample.

Fig. 3 shows the lighting of a hat store window by small single

Fig. 3.

mantle units, concealed from view, concentrating the illumination on the goods. The photograph is testimony to the excellence of the illumination.

Fig. 4 shows the show window of a hardware store lighted in the same way. The striking way the fine details are shown is especi-

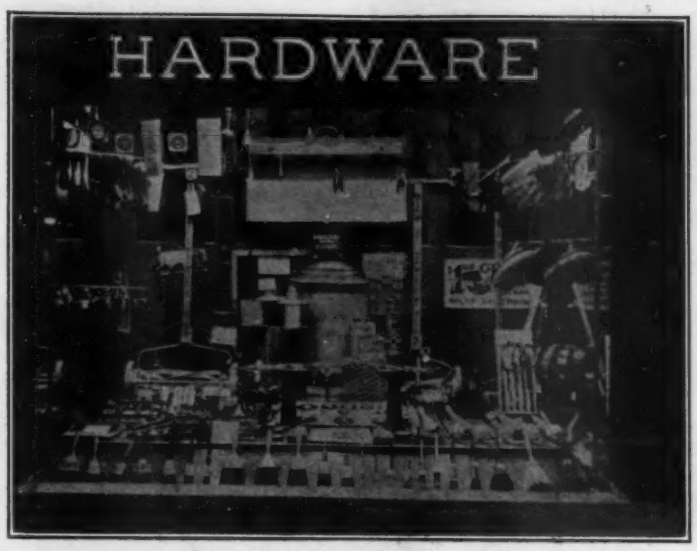


Fig. 4.

ally noteworthy, important. The lamps are equipped with reflectors which give a considerable amount of light at the horizontal, and thus furnish illumination to a brightly lighted sign in the top of the window.

Fig. 5 shows the illumination of a grocery store by cluster of small

Fig. 5.

single mantle units. The abundance and uniformity of illumination are quite evident.

Fig. 6 shows the remodeling of a church lighting installation, in which existing fixtures previously equipped with open flame burners

Fig. 6.

were altered to use small inverted single mantle units. The ignition of these burners is accomplished by the jump spark system, which has proven entirely reliable and satisfactory.

The salesman should be conversant with the requirements of good illumination and able to plan installation with assurance that good results will be obtained. He should be cautioned against advocating the use of one particular type of lamp for every installation. Nearly every merchant prefers some individuality in his lighting, and the salesman should attempt to add distinctive features wherever it can be done without prohibitive expense. Nothing is more prejudicial to the future development of gas lighting than the prevailing monotony and sameness in installations. Where economy is the principal consideration, particularly economy of maintenance, large units may be used to good advantage, but the better class lighting may be handled more efficiently by fixtures or units of special design.

Care should be taken that lamps with clear globes or with globes of very high brilliancy are not encouraged where the units come within the normal range of vision. Where indirect and semi-indirect installations are used, the customer should be impressed with the necessity of providing walls and ceilings of light colors, for without these the installation cannot give satisfactory results.

In planning special installations such as show windows, bowling alleys, billiard halls, etc., the salesman should recommend the type of lamp most satisfactory for the purpose. A horrible example of what may be done by a salesman simply furnishing the type of lamp his company happens to be exploiting for general lighting, is shown in Fig. 7. These alleys are lighted by inverted arc lamps, and the

Fig. 7.

lights over the pins are evidently small single burner lamps with globes similar to those used in campaigns. It is evident from the photograph that most of the light is delivered precisely where it is not needed—in the eye of the player. The pins which should receive the highest illumination are the worst lighted part of the alleys.

Contrast this with Fig. 8. Here two large single mantle units and two small single mantle units are provided for each pair of alleys, or one of each per alley, but equipped with proper reflectors, giving excellent illumination.

The cost of this illumination, which was pronounced by several expert bowlers the best they had ever seen, was considerably less than half that of the inadequate illumination shown in Fig. 7.

The main thing for the salesman to remember is that the most important thing is to throw the light on the goods or surfaces which require illumination, and to shield the eye of the observer. In show window lighting, particularly, it is desirable to entirely conceal the source of light from the passer-by. A visible light source not only detracts attention but reduces by contrast the apparent illumination upon the goods displayed.

If low first cost with low maintenance expense is the principal consideration, and artistic appearance of the installation is of secondary importance, much larger units may be used. An installation of this character is shown in Fig. 9, where large units with prismatic glass reflectors are used in a drug store. While in general, the large units are not favorable to the elimination of shadows, yet if the walls and ceilings are light in color and the lamps hung high they give very satisfactory results.

Fig. 8.

Fig. 9.

Indirect lighting, or semi-indirect lighting in which the indirect portion predominates, is generally more satisfactory than any system of direct lighting where clerical work is done. Recent tests show that the efficiency of the eye is reduced very rapidly under any system of illumination in which light sources of high brilliancy are used, and commercial types of lighting units are not recommended for office illumination.

Figs. 10 and 11 show inverted arc lamps lighting large interiors.

Fig. 10.

It is difficult to give in a simple form the information required in planning installations. If the salesman will observe the various installations that give satisfactory results, with the assistance of the

Fig. 11.

table Fig. 12, he can determine the number and sizes of lamps required to illuminate ordinary store or residence interiors.

Electric Incandescent Lamps				May be satisfactorily replaced by Incandescent Gas Lamps as shown below provided similar shades or reflectors are used.			
Type	C.P.	Watts	Costs of Current per hour with Current at 10¢ per Kw. hr.	Type	Size	Cu. Ft. per hour	Costs of Gas per hr. with gas at 1.00 per M Cu. Ft.
Carbon	8	25	$.0025				
	16	50	.0050				
	32	100	.0100	Upright Inverted	Junior Junior	2.0	.002
G.E.M.	16	40	.004				
	20	50	.005				
	32	80	.008	Upright Inverted	Junior Junior	2.0	.002
Tungsten or Mazda	7.1	10	.001				
	11.5	15	.0015				
	16	20	.002				
	21.4	25	.0025				
	34.2	40	.004	Upright Inverted	Junior Junior	2.0	.002
	51.7	60	.006				
	88.5	100	.01	Inverted	Standard	4.0 4.5	.004 .0045
	134.	150	.015	Upright	Standard	5.5	.0055
	250	250	.025	Inverted "	Large Single Mantle Lamp 3 Mtl. Arc.	10. 14.	.01 .014
	400	400	.04				
	500	500	.05				

Fig. 12.

For residences there is seldom any difficulty in obtaining sufficient illumination with incandescent gas lamps, as the fixtures usually provided, if equipped with the smallest sizes, will give more than adequate illumination. The most common fault in residence lighting by gas is that it gives more light than required.

The principal consideration in residence lighting is the appearance of the installation. The taste of the consumer will govern the type of illumination—whether direct, indirect, or semi-indirect—and to a large extent the kind of fixture—whether inverted or upright.

Fig. 13 is a hall lighted by a semi-indirect fixture containing a small single mantle inverted unit, controlled by a pneumatic cock with the button shown at the right, and a similar button at the bottom of the stairway.

Fig. 13.

Fig. 14 shows a dining-room dome with an outlet for gas to the coffee percolator. Gas companies should push the sale of domes thus equipped, in order that the customer may expand his uses of gas by various small household appliances.

Fig. 14.

Fig. 15.

Fig. 16.

The coffee percolator has a by-pass, so that the gas may be turned on or off at any time during the meal, giving every convenience obtainable with electricity. Such devices are not large consumers of

Fig. 17.

gas but are a powerful influence in popularizing the general use of gas.

Fig. 17 shows a single mantle inverted burner hung higher than ordinary, giving more cheerful and effective illumination than if placed at a lesser height, as the cook would often be working in her own shadow.

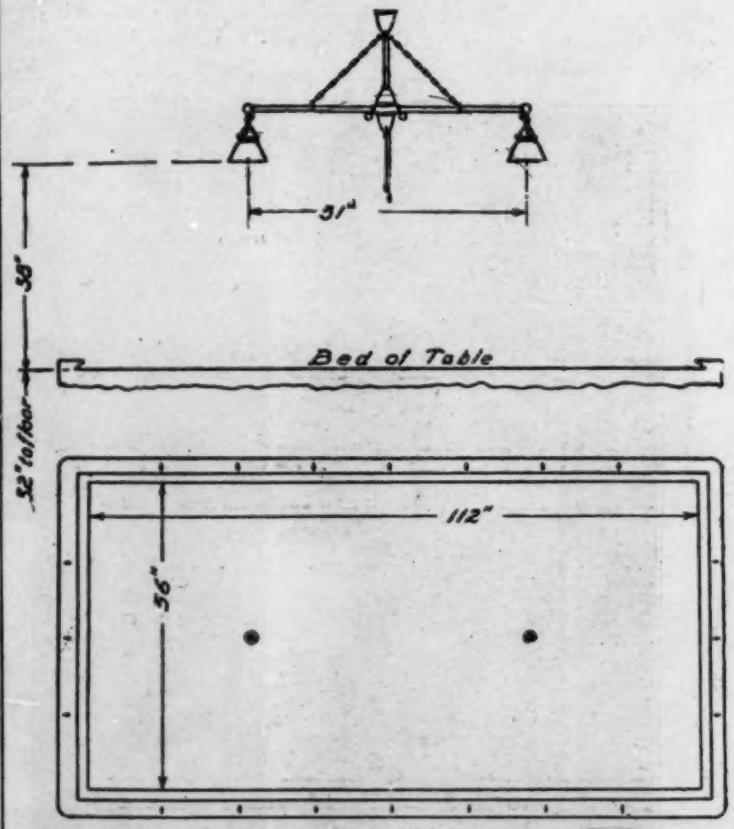
Factory lighting offers a better field for cultivation than is generally realized. The minor refinements of control, etc., which are among the principal advantages obtained by our electrical com-

Fig. 18.—Clubrooms Lighted by Inverted Gas Arcs Above a Leaded Glass Ceiling.

Fig. 19.—Clubroom Lighted with Semi-Indirect Units Equipped with Single Inverted Burners.

Fig. 20.—Billiard Tables Illuminated by Single-Mantle Inverted Lamps.

BILLIARD-TABLE LIGHTING.



The cut shows the proper spacing and height for single-mantle lamps for illuminating billiard tables in rooms with ceilings less than 12 feet high. In rooms with 12-foot ceilings or higher, the lamps should be installed to hang the mantles 7 feet above the bed of the tables.

Fig. 21.

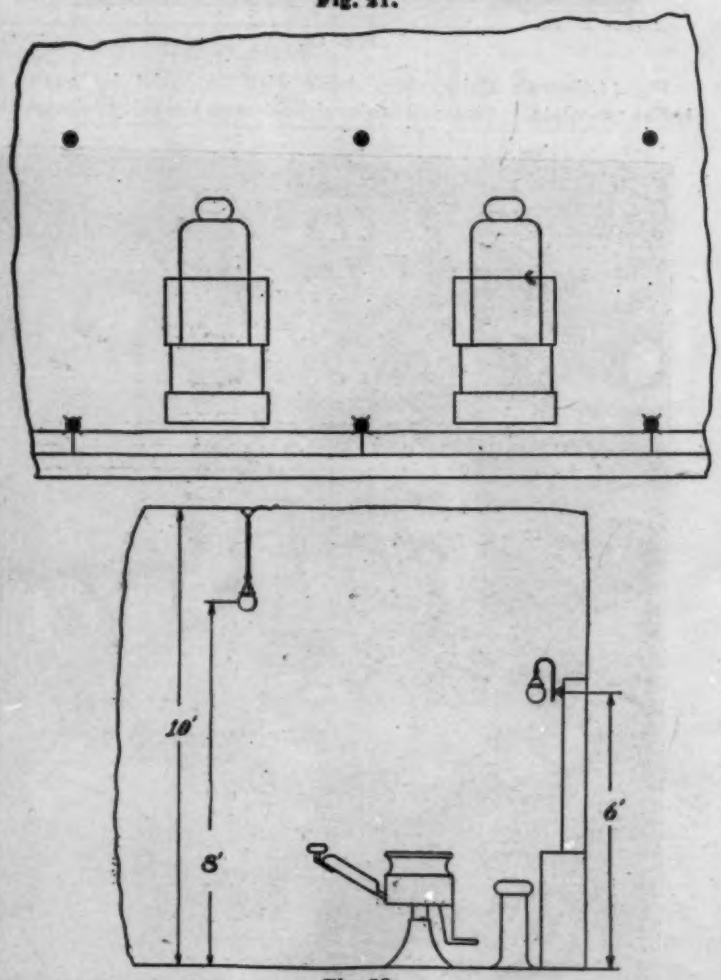


Fig. 22.

petitors, are of little importance in factory illumination, and economy, one of the strongest points of gas lighting, is of paramount import-

ance. The possibilities for industrial fuel business are becoming more and more apparent, and the salesman who calls with reference to fuel appliances may also draw attention to the desirability of gas lighting.

The relative economy of gas and electricity in factory illumination will of course depend upon the relative prices, but where conditions are favorable to the gas company, factory lighting business should be obtained with comparative ease, and they are generous consumers.

The salesman should be encouraged to avail himself of the information published by manufacturers of lighting appliances regarding location, control, etc., particularly as regards special problems such as window lighting, bowling alley lighting, etc.

Appended hereto are a number of information sheets and photographs of installations which may be used by the salesman to guide himself in planning lighting systems, or to show the consumer.

Ceiling Heights and Length of Arc Lamps.

The length of an arc lamp is given from the top of the stem to the bottom of the globe. Stems of arc lamps cannot be shortened.

Inside Arcs.	Length of Arc Lamp.	Clearance Above Floor.	Minimum Ceiling Height.
*3-burner Inverted	30½″	8′0″ to 9′0″	10′6″
4-burner Inverted	22⅝″	8′6″ to 9′6″	10′6″
*4 burner Inverted	28½″	8′6″ to 9′6″	11′0″
4-burner Upright	33⅛″	8′0″ to 9′0″	11′0″
*5-burner Inverted	32″	9′0″ to 12′0″	11′8″
Portico Light	14¼″	7′6″	9′2″
Portico Light	13″	7′6″	9′0″

*These lamps are installed with a ceiling shield, which must be 5 inches from the ceiling, therefore this length is included in the overall figures given.

Outside Arcs.	Length of Arc Lamp.	Minimum Height from Pavement.	Minimum Height for Awning.
Inverted	25″	8′0″	11′6″

This lamp is installed under awnings with a shield, which must be 1′0″ from awning.

When portico lights are installed outdoors, they must be hung 8′0″ above pavement.

Single Lights.—Single lights may be installed on existing fixtures regardless of height. Where fixtures are sold, or where lights are installed on outlets, the following table must be observed:

	Length of Light.	In Stores, Height from Floor.
With Ball Globe	9½″	7′6″
With Holophane or similar shape Reflector	9″	8′0″ to 9′0″
With Cone Shade	9″	7′6″
With Lantern Globe	10½″	7′6″

When by-pass is installed add 1″ to length.

In dwellings where passageway is probable, upright lights should be at least 6′3″ and reflex lights 7′0″ above the floor.

Upright lights in stores, minimum height, 7′0″.

A reflex light hung less than 14½″ from the ceiling must have a ceiling shield. This is equivalent to 18″ from the ceiling to globe ring of light, or 24″ from bottom of globe to ceiling.

Lamps in store windows should be hung at convenient heights, and these tables do not apply.

[Continued from page 141.]

Report of the Committee on Power Economies In Gas Plants.[1]

[Written for Eighth Annual Meeting, American Gas Institute.]

PART II.—Economy in Steam Consumption.

In gas works the greater part of the steam generated is used:

(1) By the water gas machines.

(2) By the engines driving blowers, exhausters, coal handling apparatus, electric generators, etc.

(3) By steam driven pumps.

(4) By coal gas plant heating system, and special auxiliaries.

As a rule it is more difficult to locate and eliminate steam wastes, especially those of large size, than it is to correct faults in the boiler room, as the machinery generally consists of numerous small units, widely scattered and intermittently operated. A small engine or pump may give as much mechanical trouble as a large one, and will probably be more wasteful of steam in proportion to the power developed.

(I) Water Gas Machines.

The theoretical steam required per 1,000 is 16 pounds, while the quantity actually used varies from 25 pounds to 40 pounds, depending on the generator fuel, operating conditions and capacity at which the machine is run. The steam waste is therefore from 9 to 24 pounds per 1,000, and 4 pounds of steam being equivalent to 1 pound of boiler fuel, the excess steam used in generators may mean as much as 6 pounds of boiler fuel per 1,000 or about 7 mills per 1,000 of gas. In addition to this loss, excess steam means high CO_2 in the gas, and variable fire temperatures. As in the case of air supply to boilers, it will never be possible to operate machines with the theoretical amount of steam, as it can never be evenly distributed to the fires, but it would seem that there is sufficient financial loss involved in operating generators with more than 100 per cent. excess steam to warrant improved methods of distribution of steam to the fires. So much of the attention of gas engineers has been taken up in improving oil and generator fuel results, and the cost of steam generation has been so low that apparently little attention has been paid to the question of steam supply to generators. A reduction in excess steam would not only effect a saving in boiler fuel per 1,000, but should improve the quality of the gas produced, and possibly even effect a saving in oil and generator fuel, as the machines should be able to maintain more even temperatures.

It might be argued that in gas plants where waste heat boilers are installed, steam is made so cheaply that economy in its consumption is of minor importance. While they will undoubtedly effect a large saving, it must be remembered that few plants can be operated entirely on steam produced by waste heat boilers, and every horse power developed beyond the amount supplied by such boilers, must be produced by burning fuel, so that each additional horse power must be figured at the unit cost of steam production in fuel burning boilers. Though the average steam cost may be lower, any steam saved in the plant means a proportionate saving in fuel burned under the boilers, and therefore a saving in the cost of gas per 1,000.

(J) Engines Driving Works Machinery.

1. Slow speed slide valve engines are probably in more general use than any other type. They are low in cost, simple in construction, and easily repaired, and they can be operated at variable speeds with a minimum amount of attention. They are suitable for driving blowers and exhausters of the positive pressure type, but not for high speed fan blowers. The chief objection to slide valve engines is their lack of economy, and the rapidity with which their steam consumption increases as the valve and seat wear. Their steam consumption is from 40 to 70 pounds of steam per horse power, depending on the size of the unit and its internal condition.

High speed automatic engines are higher in cost and require more care in operation. They are more economical for constant speed operation, but when operated on the throttle at variable speeds, have little advantage. The valves of most makes are subject to rapid wear and consequent reduction in economy.

Corliss and other types of automatic cut off, four valve, slow speed engines, are used to a considerable extent for larger sizes of air blowers, and with exhausters, for high speed distribution. They are high in first cost, and require more attention than slide valve engines, but give much better economy of operation.

Small gas engines are so high in first cost and in cost of maintenance, that they are little used in driving blowers or exhausters, although using commercial gas they will, as a rule, show slightly better economy than steam engines.

Oil engines are open to even greater objections as regards cost, etc. Their operating cost per horse power is lower, as they will operate on about $\frac{1}{15}$ gallon of gas oil per brake horse power, but this economy is likely to be overbalanced by fixed charges and high maintenance cost.

Steam turbines are suitable for fan blowers or exhausters, but are too fast for the positive type. They are usually operated non-condensing, and are uneconomical, using over 40 pounds of steam per brake horse-power. They have the great advantage of being able to maintain their original rate for a considerable period, as most types suffer little from leakage losses due to wear, which is a serious fault in any reciprocating engine. The modern turbine is so well designed that it can be operated with very little attention, and its

(*Continued on page* 154.)

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NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, MARCH 9, 1914.

[Official Notice.]

Annual Meeting, Indiana Gas Association.

Indiana Gas Association,
Office of the Secretary,
Indianapolis, Ind., January 24, 1914.

The annual meeting of the Indiana Gas Association will be held at Terre Haute, Ind., Wednesday and Thursday, March 11th and 12th, 1914, the sessions each day, beginning at 10 A.M. The headquarters will be the Terre Haute House, where 70 rooms have been reserved for the convention delegates. It is advisable that early application be made for reservations. If the available rooms are all spoken for, reservations may be made at the Filbeck, Plaza, or Great Northern Hotels. The programme includes these numbers:

Address by a Member of the Public Service Commission of Indiana.

President's Address, by A. S. Cooke, Terre Haute.

"Employers' Compensation," by O. O. Thwing, Chief Engineer, Western Gas Construction Co., Fort Wayne.

"Light and Illumination" (demonstrated), by R. F. Pierce, Manager, Illuminating Engineering Laboratories, Welsbach Company.

"Calorific Value, as Expressing the True Quality of Gas and Conditions Governing Its Supply," by J. B. Klumpp, Inspecting Engineer, United Gas Improvement Company.

"Yields of Gas from Coal as Related to British Thermal Units," by J. C. Silverthorn, Superintendent, Evansville (Ind.) Public Service Company.

The Association will consider the question of revising its Constitution and By-laws, so as to provide that any member whose dues shall remain unpaid for a term of 1 year (instead of 3 years, as at present provided), may, at the discretion of the Executive Committee, be dropped from the roll of membership. Philmer Eves, Secy.

[Official Notice.]

Tenth Annual Meeting, Illinois Gas Association.

Illinois Gas Association,
Office of the Secretary,
115 North Oak Park Ave.,
Oak Park, Ills., Feb. 21, 1914.

To the Members, Illinois Gas Association: The Tenth Annual Convention, the Illinois Gas Association, will be held in Chicago, March 18th and 19th, 1914, at La Salle Hotel. The following papers are included in the programme:

"The Welding and Cutting of Metals in the Gas Industry," by W. P. Harding.

"Trenching Machines Versus Hand Digging," by C. B. Strohn.

"Utilization of Gas Appliances in the Wholesale Preparation of Food," by I. A. Hoy.

"Street Lighting by Gas," by F. V. Westermaier.

"Applications of Centrifugal Machinery for Boosting and Exhausting," by E. A. Hultz.

"Modern Coal Gas Practice," by W. E. Hartman.

"The Process of Manufacture of Gas Stoves and Ranges, from the Raw Materials to the Finished Products."

"The Process of Manufacture of Pipe, from the Raw Materials to the Finished Products."

The banquet will be held, in the Red Room of La Salle Hotel, the evening of 18th. To be of the modern stag style, with prominent speakers and vaudeville acts.

Copies of the papers and the programme will be mailed to the members on March 10th. Horace H. Clark, Secretary.

[Official Notice.]

Sixth Annual Convention, Pennsylvania Gas Association.

Pennsylvania Gas Association,
Office, the Secretary, West Chester, Pa.,
Feb. 23d, 1914.

To the Members, the Pennsylvania Gas Association: The Sixth Annual Convention, the Pennsylvania Gas Association, will be held in Allentown, Wednesday, Thursday and Friday, April 8th, 9th and 10th, 1914. The headquarters will be in the Hotel Allen. A list of the other hotels will be mailed. Early reservations are requested so that every member attending may be properly accommodated. Papers on the following subjects are promised:

"Improving Operating Conditions for Small Works."
"Office Practice."
"New Business Methods."

There will also be a number of topics up for discussion, and in order to give sufficient time to the more important subjects each member is asked to submit such subjects as he may be interested in, and the topics receiving the greatest number of requests will be considered.

All requests should be forwarded to Mr. G. S. Speaker, Lebanon, Pa.

The entertainment arranged provides for this;

Tuesday night: Informal Dutch supper.
Wednesday night: Theater.
Thursday afternoon: Open.
Thursday night: Banquet.

The Secretary requests that the postal card enclosed with each member's preliminary notification be returned at once to Mr. Crankshaw, to the end that the work of the Committee may be successfully carried out. W. O. Lambon, Jr., Secy.

BRIEFLY TOLD.

Who Have Most Interest in National Advertising.—The announcement of the success of the Society for Electrical Development in securing pledges for its $200,000 fund for a National Advertising Campaign, gives the following classification of the subscribers to the fund. Total subscribing, 1,300; of whom 279 have to do with central stations (producers of current), and 1,021 manufacturers of and dealers in appliances and supplies. Surely this indicates a general feeling that the appliance men are the ones looking for direct benefit, and the sellers of current being interested directly to a much smaller degree. This is in line with the comment of Mr. Cohn at the Philadelphia meeting of the N. C. G. A., when he said that this electrical campaign was being urged and supported by the manufacturing interest rather than the electrical utilities. The attitude of these utilities seems to be paralelled by the interest of the gas utilities in the scheme for national advertising. While this move of the electrical interests will have to be met by gas companies, many still feel that local advertising and other direct effort by the individual companies constitute the better way to combat it.

Panama-Pacific International Exposition.—Intending exhibitors at the named Exposition will be interested in the announcement made recently by President Charles C. Moore that the installation of exhibits may begin as early as July 1 of this year. This will enable exhibitors to devote 9 months to the preparation of their displays, and eliminate any necessity of haste in preparation and installation. The Expbsition is making no charge for space to exhibitors, and

every effort will be made to assist the exhibitor and to reduce the expense incidental to exhibition. Arrangements have been made whereby manufacturers sending less than carload lots may combine with other exhibitors and obtain the carload freight rate. Exhibits may be sent to a representative of the Exposition at one of 3 central branch stations at St. Louis, New York and Chicago, and he will assemble exhibits to obtain the carload rate and consign directly to the Exposition.

U. G. I. COMPANY'S SAFETY RALLY.—Another largely attended "Safety Rally" was held in the Griffith Hall, Philadelphia, the evening of February 25th. Mr. J. B. Douglas, Chairman, opened the meeting with an address, in which he announced that, comparing 1913 with 1912, there had been 10 per cent. fewer accidents reported to his department, and 225 fewer days of disability from accidental injury, notwithstanding that many more men were employed. Mr. P. T. Dashiell, Assistant Engineer of Works, spoke of the necessity for eternal vigilance, remarking that protective devices, no matter how numerous, did not of themselves prevent accidents; care and caution were the large factors. There were several ways of doing any job, and the foreman should know how his men are going to proceed. The reputation of being a safe man to work under is one of the most valuable recommendations a foreman could have. Mr. F. G. Thorne, Engineer of Construction, told of gas works extension, in progress for the past 9 months, that had so far involved the expenditure of $80,000 for labor, with but one slight accident. At times the men at work represented 9 trades under 4 contractors. Mr. W. M. Wood detailed the causes of a number of accidents in the distribution department of the gas company in Kansas City, each case conveying its lesson. The film, "The Making of an American," showed the instruction of a newly arrived foreigner in the observance of the rules and precautions for safety adopted by the United States Steel Corporation at its Gary plant. The laborer, previous to entering upon his duties, is carefully instructed in the avoidance of dangers. Two of the devices illustrated were a safety hook for hoisting, and a portable car derailing signal, that derails the car or locomotive which fails to stop in obedience to the signal. Mr. S. H. Thompson, Agent, Spring Garden District, spoke of accidents to collectors and meter readers. He detailed the instructions constantly impressed upon his men to avoid being bitten by dogs, and the hazard of open hatchway or trap-door entrances to cellars. matches must not be used in the vicinity of a gas leak, and it was the duty of anyone detecting a leak of gas to notify the company at once. Mr. L. R. Palmer, Vice-President, National Council of Industrial Safety, and Chief Factory Inspector of the State Department of Labor and Industry, described the activities in his field, and felicitated The U. G. I. upon taking such a prominent part in the work of conservation of life and limb. Mr. T. H. Carrow, Safety Inspector, Pennsylvania Railroad, outlined the results from efforts towards accident prevention by his employers. Of 20,000 recommendations made by employees towards accident prevention, 17,000 had been adopted, involving the expenditure of more than ½ million dollars. Mr. Douglas illustrated by lantern slides the cause of each of a series of accidents in-and-around gas works and electric stations. Mr. H. H. Ganser, Norristown, in a rousing talk, called for the co-operation of everyone in the work of accident prevention. He said that the safe foreman was always a skillful one. The film shown, "The Price of Thoughtlessness," illustrated various accidents occurring in street traffic. "The Crime of Carelessness," showed a factory fire, due to throwing away a lighted match, and injuries in trying to escape through an obstructed fire door; a third film, "The Man He Might Have Been," portrayed the career of the unskilled laborer as compared with the man who has learned a trade. Mr. Douglas, in conclusion, said, "Let us all pull together and see what can be accomplished towards making 1914 our banner year in safety work."

ACCIDENTS THAT MIGHT HAVE BEEN PREVENTED.—We are indebted to the attention of Mr. J. B. Douglas, Manager, Claim Department, U. G. I. Company, for this clever compilation of accidents that might have been prevented:

1.—Strip of tin used to protect unfinished course of brickwork, blew off and struck workman.

Suggestion: Turn down edge, and weight down strips used for such purpose.

2.—While descending stairs, workman slipped, due to the sharp pitch and narrow treads.

Suggestion: Care in using such stairways. Wherever possible, have stairways with an easy pitch and safe treads.

3.—Injured one stepped on loose nail, which, turning up, punctured foot.

Suggestion: Keep passageways and platforms clear. Wear heavy-soled shoes.

4.—Gas arc fell, when injured pulled lighting chain; due to defective coupling.

Suggestion: Inspection, to see that supports are of sufficient strength and properly connected.

5.—While changing nipples on a display gas line, excaping gas ignited from nearby pilot and burned fitter.

Suggestion: When changing brackets, etc., see that no flames are nearby.

6.—While standing on small box, drilling hole in wall, workman slipped, missed drill, and hammer struck helper on hip.

Suggestion: If necessary to stand above floor, see to it that footing is ample and secure.

7.—While standing on ladder, to adjust new window cords, ladder slipped on greasy floor.

Suggestion: Safety feet on ladders, or extra men, to steady ladder. Keep floors clean and dry.

8.—In climbing from cab of hoisting engine, fireman slipped on guard rail. Guard rail collapsed, throwing him to the ground.

Suggestion: Always use *steps.* Guard rails not placed for climbing purposes.

9.—Workman tripped over clinker bar lying on floor.

Suggestion: Racks.

10.—Injured leaned grate bar against runway. A passing employee struck it, causing bar to fall on foot.

Suggestion: Lay materials flat on ground and close to wall. Keep passageways clear.

CURRENT MENTION.—

THE next meeting of the Philadelphia Section, Illuminating Engineering Society, will be held at 8 P. M., Friday, March 20th, in the rooms of the Engineers' Club, 1317 Spruce street. The meeting will be preceded by the usual dinner, served in the Club's dining room at 6:30 o'clock. The programme promises much that will prove unusually interesting, in that Mr. F. D. Bartlett promises a paper on the "Lighting and Signalling Systems of Subways," and that Prof. James Barnes will descant on "The Sun: The Master Lamp." The meetings of the Section have been of the most successful sort, and Prof. Hoadley and his Committee are to be congratulated over the interesting programmes they have arranged for the sessions.

MR. JOHN M. COMMERFORD, for a lengthy term in the service of the inspection division, New York Consolidated Gas Company, died at his home, 102 Kingsland avenue, Brooklyn, New York, the morning of February 27th. His widow and mother survive him.

A JOINT meeting of the New York Members of the American Society of Mechanical Engineers, American Institute of Mining Engineers and the American Electrochemical Society will be held at 8:15 P. M. tomorrow in the lecture hall, 29 West 39th street. The programme calls for speeches by Mr. F. E. Ives, who originated the tripak and trichrome systems of color photography and who, for 30 years, has made color photography a specialty; by Mr. Westley Allison, representing the Lumiere Jongea process; and by Mr. John Powrie, the originator of the Warner-Powrie system. Secretary Edward Van Winkle, 90 West street, N. Y., informs us that a general invitation to those interested has been and is extended.

AT the first annual meeting of the Compressed Gas Manufacturers' Association, held in New York, some time ago, the retiring President briefly reviewed the activities of the Association during 1913. Precise reports from certain standing and special committees were read and disposed of, after which the following members of the Executive Board for 1913 were elected:

Becher, E.	Godley, G. McM.	Greiner, J. B.
Hayrock, G. S.	Heller, A. A.	Hirschland, Franz
Johnston, W. A.	King, O. S.	Lilienthal, C. J.
Lieber, H.	Minor, J. C.	Morrison, A. C.
Sholes, J. G.	Stewart, J. T.	Sturke, H. E.

The Board subsequently organized by electing these chief executives:

President.—Dr. Hugo Lieber.
First Vice-President.—J. E. Greiner.
Second Vice-President.—A. C. Morrison.
Secretary and Treasurer.—Jno. J. O'Rorke.

The outgoing Executive Board entertained the members of the Association at an informal dinner, which was given at the Manhattan Club, 26th and Madison, the evening of the session's day. Covers were laid for 60, and Dr. Lieber presided in the manner and form that are characteristic of his own good self.

(*Continued from page* 151.)

cost of maintenance is low. The first cost of small turbines is higher than that of slide valve engines and less than that of high speed or Corliss engines.

Electric motors are probably the most satisfactory drive for all types of blowers and exhausters. The are low in cost, easy to install, require practically no attention and their cost of maintenance is very low, especially if induction motors. Their economy of operation depends almost entirely on the cost of power at the generating station, as line and conversion losses will be slight. This method of driving is open to one serious objection, danger of interruption to service. In some plants where the installation of motor drives has been justified on account of improved economy, and where there was no market for second-hand slide valve engines, the engines have been kept in position and the motors so set that in case of an interruption to electric supply the engines could be put in service.

Care of Engines.—In order that prime movers of any type may be economical of operation it is necessary that they be regularly examined and tested to determine their mechanical condition, internal as well as external. The greatest loss in economy in any engine is generally in leakage through valves or piston rings, and these must be regularly tested for tightness. A steam engine can be quickly tested for valve leakage, by disconnecting the valve gear, and so placing the valve that both admission ports are covered. If any considerable amount of steam blows through the valves, they should be reseated. This leakage can be observed by opening the indicator cocks, or disconnecting the cylinder drains. Similarly, exhaust valves can be tested, a test valve being placed on the exhaust pipe or the latter disconnected. The tightness of piston rings can be determined by placing the engine on center, with the valve gear connected. The steam valve will then have lead on one end and be closed on the other. If the valves and rings are tight, steam should be discharged at full boiler pressure through the indicator cock on the end having valve lead, and little or no steam should show at the cock on the other end. Steam valves and pistons are seldom absolutely tight, and some experience is necessary to determine if the leakage is great enough to warrant repairs. Engine piston clearances should be taken at regular intervals and the piston examined to see that it is tight on the rod.

Engines are subject to friction losses, in tight bearings, improperly packed rods and poor lubrication of bearings or internal parts. Packing should not be set up so tightly as to bind the rods, and badly scored rods should be replaced. For all but the smallest engines, metallic rod packing is recommended.

As a rule the tendency is towards excessive rather than insufficient use of oil, and it is dangerous to attempt to reduce the use of oil to most economical point, as most engineers have other duties besides actual engine operation, and when using a minimum amount of oil a little inattention may cause damage that will cost more to repair than can be saved in many months by reduced oil costs. Oil should be of good quality, though the highest grades are not economical for gas works use, and it should be protected from dirt and dust by closed tanks or filters. Machinery located at the end of long runs of pipe is sure to receive wet steam, unless protected by efficient separators, and a properly compounded cylinder oil should be used in such cases.

Economical Operation of Units.—Another factor in economical operation of prime movers is the way in which the load is carried by them. An engine of any type will operate at best economy at the speed, load and steam pressure for which it was designed. Some engineers prefer to operate two units at half load of speed, rather than a single unit at full load, especially exhausters on a relief holder where the quantity of gas to be handled may change rapidly, and close regulation can be more easily obtained with two units than with one. If close regulation is of first importance, it may not be possible to avoid this loss, but where several units are kept in operation, because it saves a man extra work in starting and shutting down, the practice should be stopped; as not only are these engine losses due to decreased efficiency, valve and piston leakage, and friction losses on an extra engine, but all blowers and exhausters have great slip and friction loss when operating at slow speed.

Engine belts are frequently a source of loss in economy and should be carefully watched. Direct connected units are to be preferred. Cast iron pulleys are dangerous and should be given the hammer test and regular inspection at frequent intervals.

Comparison of Fans and Positive Blowers.—Little can be done with either positive blowers or fan blowers to increase their operating efficiency, except to insure their being properly lined up, well lubricated; engines to be operated as nearly as possible at maximum load for which they are designed, and, in the case of positive pressure machines, to see that the clearances are reduced to the minimum. The slip in positive blowers should not be over 20 per cent., but if the bearings are allowed to wear, clearances are increased, so slip may become much greater, and finally the machine may be wrecked by the rolls striking the casing. Bearings, gears and blades should be examined at regular intervals, and clearances equalized. This slip can be determined by closing the outlet valve, and bringing the pressure in the blower up to that at which it is normally operated, a water or mercury gauge being connected to the outlet, inside of the valve. When this pressure is reached, the speed of the machine can be adjusted to maintain this pressure, and a comparison of this speed with the maximum speed of the unit at full capacity and at this pressure will give the slip of the blower.

In purchasing new equipment there is usually a choice between positive pressure machines and fans for air supply and gas handling, and a brief summary of the advantages of each type may be of interest.

Fan blowers are usually high speed, and driven by electric motors, turbines or engines, and are lower in cost than positive blower units, and require less floor space. Their economy of operation depends on that of their prime mover, but their mechanical efficiency is slightly less than that of positive blowers. They require less attention than positive pressure machines if properly lined up, and can be operated for long periods with little or no loss of efficiency. Since the outlet pressure of fan blowers is dependent on the tangential velocity of their blades they are open to the objection that when driven by constant speed motors their discharge pressure cannot be changed to suit changing generator conditions, and, with turbine or engine drives, changes in pressure can only be obtained with considerable loss of efficiency in the driving engines. In cases where a fan supplies air to only one machine, if it is operated continuously, the power consumed while the fan is running with a friction load, during the gas making period, will be from 30 to 50 per cent. of its full load power consumption. If it is so operated its average economy will be less than that of a positive pressure blower, but if it can be shut down during the gas making period, its average economy will be slightly greater. Frequent shutting down and starting up will mean additional labor cost or automatic control of the driving engine or motor.

With a positive blower, serving a single machine, if a mercury gas governor is used, the unit may be slowed down until it is running with slip alone, and the power used should not be over 15 per cent. of its full load consumption. A positive blower can be regulated to produce any desired discharge pressure, and it can be varied between wide limits without changing the speed of the unit to any great extent, though the load on the engine will decrease as the pressure is decreased, with a consequent slight falling off in efficiency. With fans pressure changes can only be obtained by speed changes and discharge volumes vary with the width of opening of the discharge valve, up to the limit of the power of the driving member of the unit. With positive blowers, the discharge volume varies with the speed of the machine, the pressure depending on the relation between quantity of air used and that supplied, fairly steady pressure being maintained by regulating the engine speed so as to make the supply equal to the demand. When two or more blowing units are operated in parallel, a much more uniform pressure can be maintained with fans than with positive blowers, and fans are usually to be preferred when Venturi meters are used to determine the air supply to generators. The Committee believes that, considering all the advantages of each, where plants are likely to operate with fairly uniform conditions, the fan blower is to be preferred; but where plants are likely to frequently change generator conditions, due to variations in fuel and machine capacity, the positive blower will give better service.

Positive pressure machines are generally preferred as exhausters on account of their greater flexibility in the matter of pressure control and capacity regulation without valve manipulation. For pushing gas at constant pressures, fans have the mechanical advantages already stated, but are open to the same objections as when used for blowers.

Air Compressors.—Compressed air is used in some gas works, and a few remarks on air compressor operation should be of interest. They are usually steam driven, and have most of the faults found in steam engines. The air ends are apt to be a greater source of loss than the engine, usually from leaky valves or pistons, more often the former. A compressor can be tested for air leakage by running it with closed discharge valve, maintaining the operating gauge pres-

sure by throttling off the steam, and noting the speed at which it operates to maintain this pressure without discharging any air.

(K) Pumping Machinery.

Pumps are often responsible for a large part of the total steam consumption. Not only are they of every size and type, but they are used for handling all kinds of liquids. (This subject was thoroughly covered in Mr. Underhill's paper on "Pumps for Gas Works' Purposes," in the Proceedings of the American Gas Institute for 1910.)

Leakage through valves on the water end is the most common cause of loss in reciprocating pumps, usually due to lack of attention to the condition of the valves and seats. Recent tests showed that in a pump equipped with a perfectly fitting set of valves having a slip as low as 3 per cent., this slip may increase to 20 per cent. in two months if the water end receives no attention. Soft rubber valves quickly wear and crack or bend out of shape. Metal valves wear more slowly, but wear down the seats in spots. Metal valves on metal seats cannot be tight unless perfectly true, and special attention must be paid to the condition of seats and valve faces, where metal, hard rubber or hard composition valves are used. Valves of a hard fiber composition are being used with considerable success with hot water, oil, tar and ammonia. A new composition valve recently placed on the market, while resisting the action of heat and acids, softens sufficiently in service to conform to seats which are slightly out of true, as do soft rubber valves. It is hoped that these valves will prove suitable for service with gas works pumps.

Some new types of valve seats have recently been developed which should add greatly to the life of pump valves, and increase the economy of operation. One of these, the turbine seat has its water passages in a spiral, so water is forced through the seat at an angle and gives the valves a slight rotary motion on their seats. Also, the height of valve lift for a given area is reduced, and less energy is expended in lifting them. A reduction in steam consumption of from 10 to 30 per cent. has been obtained by using these seats, and the efficiency is likely to remain high for a longer period of operation than with plain seats. They are high in price, but the increased economy warrants their installation on pumps which are continuously operated. The Hill valve seat reduces wear by making contact on narrow raised rings on the valve and seat instead of on the entire face. This type is comparatively cheap, and the cost of renewing the rubber rings which form the contact faces on the bottom of the metal valve discs is much less than rubber valve replacements.

(L) Coal Gas Plants, Heating System and Auxiliaries.

Steam plants of works manufacturing both coal and water gas are subjected to the additional load put on them by steam consumed in the former process, and boiler fuel per thousand of water gas is naturally somewhat higher than in those works making water gas alone. Rotary steam engines driving charging and discharging machines are uneconomical even when in the best condition and usually little attention is paid to their economy, as long as they operate satisfactorily. Scurfing with steam is likely to be costly if nozzles are allowed to wear. Steam is also used under benches in many plants, and may be used for coal handling and crushing machinery. It is difficult to determine the steam per thousand used in coal gas manufacture, and it will be difficult to take any special steps towards a reduction in this consumption, except as to the economic condition of the machinery. Where coal gas plants are supplied from the works' boiler plant, a recording steam meter should be installed in the line, and the steam measured charged to the manufacture of coal gas, in order that the records of boiler fuel per thousand of water gas may be correctly kept.

Steam for heat during cold weather, including holder cups, may amount to a considerable percentage of the total boiler output in works of large areas. It is seldom possible to accurately meter this steam as it is likely to be taken from the lines at many different points. Heating systems may use exhaust steam where there is an excess over the amount required for heating feed water. Where live steam must be used reducing valves should be used and steam supplied to the heating system at not over 10 pounds gauge pressure. Wherever possible, drains from radiators and traps should be piped to feed water heater.

Steam Leakage.—Visible leaks are uncommon in well managed plants, but invisible leaks often exist without being suspected. Wasteful leakage may usually be found in throttle valves of idle machinery, in open or leaking valves or cylinder drains, and in traps or pipe drains which discharge directly to sewers. Regular tests should be made for throttle and cylinder drain valve leakage, and all leaky valves made tight. It is sometimes difficult to determine if traps are leaking, and it is suggested that the discharge of each trap be fitted with a test valve which can be left open to the atmosphere and the action of the trap observed.

(M) Use of Exhaust Steam and Waste Heat in Gas Works.

The steam used per thousand of water gas made will range from 60 pounds to 150 pounds; and 90 pounds of steam, or 10 pounds of coal, per thousand, may be taken as a fair average figure for gas works of moderate size with efficient equipment. Of this 90 pounds about 30 will be used in the gas machines, and of the balance at least 40 pounds used by machinery leaving it available as exhaust steam for further work. The quantity used for heating feed water from 50° F. to an outlet temperature of 212° F. will be about one-seventh of the total steam or 13 pounds per thousand. In the average plant we would then have 27 pounds of exhaust steam per thousand in excess of that needed for feed water. If the machinery is so grouped that this steam can be collected in a common exhaust pipe, it may be utilized for one or more of the following purposes:

(a) Exhaust steam or hot water heating system.

(b) Exhaust steam turbines for driving electrical generators, or other power work.

(c) In water gas generators, replacing live steam.

Exhaust steam heating systems are high in installation cost, and are only used 6 or 7 months of the year.

The exhaust steam turbine has been successfully used in power plants, and has clearly demonstrated its economic value. Its use in gas works is covered in a paper by Mr. Davis, appended to this report, who also reports on the use of exhaust steam in gas machines. Waste heat boilers have been in use for a sufficient time to show their value as economical generators, and the appended paper by Mr. Dashiell fully covers this.

APPENDIX "A."

The Use of Exhaust in Steam Turbines.

The power plant of the gas works, consisting as it does of numerous engines, pumps and small turbines, is no condensing proposition. A condenser of each piece apparatus would be prohibitive in cost and a central condensing plant would be prohibitive in maintenance, and the saving would be comparatively small. Assuming that 90 pounds of steam is the average consumption per 1,000, and that the gas machines take 30 pounds, there is left about 50 pounds for the plant machinery. Thirteen pounds of this would be used in heating the feed water, leaving only 37 pounds on which gain could be made by condensing. The gain would be about 25 per cent. or 9¼ pounds of steam per 1,000, equivalent to little more than 1 pound of coal.

The steam turbine has in recent years made a special place for itself in utilizing the steam from atmosphere to a high vacuum. This is due to the fact that in a turbine the expansion is continuous from the highest pressure to the lowest, while in the low pressure engine cylinder the expansion is from the higher pressure to the release pressure, which is always considerably above the condenser pressure. Theoretically an engine could be built to expand to the condenser pressure, but the low pressure cylinder would be so large that more would be lost through cylinder condensation than could be gained.

An ordinary engine and an exhaust steam turbine working under high vacuum will give better economy than the same engine working condensing, or even of a compound engine working condensing, and equal to the economy of a high vacuum turbine. The efficiency of an engine between boiler pressure and atmosphere may be as high as 75 or even 80 per cent. and that of the turbine between atmosphere and 28 inches vacuum would be at least 55 per cent., or a combined efficiency of almost 70 per cent. between boiler and condenser pressure. This is considerably better than either the turbine or the engine working alone, and even with an ordinary gas house engine, which is about as inefficient as can be found, the combination of the engine and the exhaust steam turbine will give very fair economy.

An exhaust steam turbine, of say 200 kilowatts, will deliver a kilowatt hour on about 42 pounds of steam. Assuming, as in the body of the report, that there are 27 pounds of exhaust steam ordinarily thrown away, we could produce $\frac{27}{42}$ or about $\frac{2}{3}$ of the kilowatt per 1,000 cubic feet of gas. The cost of condensing would amount to about 15 per cent., so that we can net at least $\frac{1}{2}$ of a kilowatt per 1,000 without any increase on the boiler plant. This power is especially useful in the case of plant additions, as it is cheaper in first

cost than new boiler equipment, and of course more economical in coal.

In practice it is found more satisfactory to use mixed flow, rather than straight low pressure exhaust turbines, as, on account of the variation in the quantity of exhaust, it is impossible to utilize anywhere near all the steam and carry a steady load, unless high pressure steam is used to help out. In combined gas and electric companies a strictly exhaust machine can be used in parallel with the main electric station, and the high pressure units will act as governors and take care of the varying output of the turbine.

Another method is to store up in a so-called regenerator sufficient exhaust to carry over times of deficient supply, the regenerator being recharged at the time of excess steam. The regenerator depends upon the principle that if water is raised to its critical temperature for any given pressure, and the pressure released, enough of the water will be evaporated into steam to reduce the temperature to the critical temperature for the new pressure created. For instance, if 5 pounds back pressure is carried on the exhaust lines, the steam passing through the generator on the way to the turbine will heat the water to 227° F.: and when the exhaust is deficient and the pressure drops to 3 pounds, enough of the water will evaporate into steam to reduce the temperature to about 222° F., the critical temperature for this pressure. When there is an excess of exhaust, enough will be condensed in the regenerator to bring the temperature of the water back to 227°. In such an installation the high pressure limit is maintained by a relief valve and the low pressure by the addition of live steam. Regenerators are expensive, in some cases costing as much as the turbines, and their worth must be decided for each individual case, considering the price of boiler coal and the variations of steam flow. The amount of saving depends upon the conditions, price of boiler coal and whether the power can be sold or must be utilized in the plant.

APPENDIX "B."

The Use of Exhaust Steam in Water Gas Generators.

The pressure in the base of a water gas machine rarely exceeds 2 pounds, and if the back pressure on the engines can be increased to this figure, the exhaust steam can be utilized for making water gas. The only difference between live and exhaust steam is the temperature and the total heat. When steam of about 125 pounds gauge pressure, and with about 2 per cent. of moisture, is expanded through a valve to 2 pounds (general pressure) the temperature drops to about 280° F., which is approximately 60° superheat. Unless the steam impinges directly upon the fire it is doubtful if any of this superheat reaches the fire, as it is taken up in heating the blast compartment and the base of the machine. But we can at least assume that the steam strikes the fire bed with no entrained moisture.

Experiments were first carried on with the machinery exhausting directly into the base of the gas machine, only such water being taken out as the ordinary separator would remove, the results being encouraging. The amount of gas made by the machine was reduced slightly, the generator fuel increased and the boiler coal decreased. At this particular plant the cost of generator fuel is about 3½ times that of boiler fuel, so that the saving shown by the boilers was more than offset by the increase of generator fuel. The fires in the generator were not as good as with live steam, the clinker showing more tendency to stick to the sides, the fire zone being considerably higher than ordinarily found in good operation. In appearance the fires were cold.

To overcome the effect of the moisture, and to reduce generator fuel, a separately fired steam superheater was installed to raise the temperature of the exhaust steam. At the start the temperature was carried at about 300° F. (the same as live steam) but this was soon raised to 425° F. equivalent to a superheat of 200°. Considerable improvement was noted up to this point but none beyond it. Table No. 1 shows the results of the first experiment, and a 30-day average of the station 6 months later.

Table 1.

	First Experiments.			30-day average on Superheated Exhaust (6 Mos. Later.)
	Live Steam.	Saturated Exhaust.	Superheated Exhaust.	
Gas made per sq. ft. of grate surface cu. ft	38,300	35,850	40,406	50,100
Pounds of carbon per M. cu. ft. of gas	26.69	27.49	25.73	26.04
Boiler fuel per M cu. ft. (including superheater fuel)	25.46	23.90	21.56	20.62

Encouraged by these results, a station of six 12-foot Williamson machines was equipped for exhaust steam, with results shown in Table No. 2.

Table 2.

	First Results.		30-day Average on Superheated Exhaust (7 Mos. Later.)
	Live Steam.	Superheated Exhaust.	
Gas made per sq. ft. of grate surface	38,150	39,100	47,403
Pounds of carbon per M. cu. ft.	28.02	27.60	27.06
Total water used in boilers, pounds per M cu. ft.	130.5	92.5	86.4
Pounds of boiler coal per M cu. ft.	21.05	14.35	13.40
Superheat fuel — equivalent boiler coal	....	0.70	0.48
Total boiler and superheater fuel	21.05	15.05	13.88

The boiler fuel saving is very pronounced, at least 20 per cent. At both stations the gas is pumped out under high pressure and this accounts for the high boiler water and boiler coal used. The generator figures are a little better with superheated exhaust than with live steam but no special merit is claimed as the difference is very slight.

The chief advantage of the superheated exhaust is in the entire absence of water. Vaporization of water is not a function of the gas generator, and expensive fuel is needlessly substituted for much cheaper but just as useful boiler coal. The less water in the exhaust steam to the generators, the more efficient should be the operation. In practice, when using superheated exhaust, there is no water in the lines and none condenses in the bottom of the generator, and as a consequence the clinkers in the fire are a little tougher and harder to handle than with the live steam.

The superheater was fired with tar and was in operation 15 months without being allowed to cool. At the end of that time it was necessary to renew 8 or 10 elements, but it is believed that if the furnace had been designed for tar no repairs would have been necessary for some years. Tar is used because of the slight care required, and the operation of the superheater has been added to the duties of the fireman. A recording thermometer and a recording pressure gauge show the variation in pressure and temperature. The temperature is quite constant, rarely varying more than 25° in 24 hours.

The question of a constant steam pressure in the exhaust line was solved with some difficulty. The intermittent use of turbine blowers varied considerably the amount of steam passing to the superheater, and as sometime happens, the numbers of generators blowing and making gas were very unequal. For example, with 1 generator blowing and 2 or 3 making, there will be hardly enough exhaust steam, while with 2 or 3 blowing and only 1 making gas, there will be considerable excess. To remedy this condition a regulating valve was installed to open and admit live steam to the exhaust lines when the pressure in them dropped to 2½ pounds, closing at 2¾ pounds; when a relief valve opens at 3 pounds to allow excess steam to escape to the atmosphere.

Exhaust steam in generators is impracticable unless proper control is exercised and as every pound added to the pressure of the exhaust makes 2 or 3 per cent. increase in the steam consumption of the engines, any method of measurement depending on a loss of pressure cannot be economically used. At the start, the pressure in the base of the generator was taken as an index of the amount of steam passing through the fires, but it was not reliable except when only 1 machine was operated.

General Electric meters similar to their boiler meter were tried, but as the steam pressure was not sufficient to raise the water from the condenser to the meter it was a failure. A special Pitot tube was designed, with reservoirs similar to condensers as part of the tube. These reservoirs are separate from the static and dynamic tubes and drain back to the main steam header, the differential pressure being maintained by water seal between them. From the top of the reservoirs pressure lines of at least ¼ inch were laid to the ordinary meter condensers and then to the meters. Great care was used to see that the lines connecting reservoirs to the condensers were as near perpendicular as possible so that they would drain quickly, and the exposed tube and lines were insulated by plastic magnesia. While this method is open to objections, it has worked satisfactorily and the error due to difference in density between the vapors in the pr ssure tubes does not seem to effect the accuracy to any great extent.

Whether it is necessary to superheat the exhaust is a question of difference in cost between boiler fuel or tar and the generator fuel used. Where generator fuel costs from three to four times the boiler

fuel the superheater investment pays, but where the two fuels are close together it is an open question. In several plants in the East exhaust steam is used directly in the machines with some increase in generator fuel and a considerable reduction in boiler fuel.

The need of a regenerator depends upon the particular installation, and the cost must be figured against the saving expected. In both of the installations noted the exhaust from the plant machinery exceeds the steam needed, so that live steam is admitted by the reducing valve only a very small percentage of the time.

APPENDIX "C."

Waste Heat Boilers as Applied to Water Gas Sets

Both tubular and water tube boilers are successfully operating on waste heat from water gas sets, in some of which a portion of the heat of the blast gases only, and in others, of both blast and illuminating gases is recovered.

The tubular boilers consist of a steel shell with two crown sheets, into which 4 inch tubes are expanded; the shell carefully lagged. The inlet end of the shell is as close as practicable to the superheater of the set and connected thereto by steel pipe connections. The arrangement for cutting off the boiler from the set when the former is to be put out of commission, consists of a pair of flanges, between which a cast iron ring is bolted when the boilers are in operation, and a cast iron disc when the boiler is to be out out. Ring and disc are handled by a chain block, on a light swinging arm or davit. An arrangement of turn-buckles and draw bolts for aligning the flanges renders the placing of the ring or disc an easy matter. A short stack with a heavy stack valve takes the gases from the boiler and discharges them to the atmosphere.

A large steam drum is necessary in any type of waste heat boiler, as the flow of gases through the boiler is intermittent. This causes a surging of water, and unless there is ample steam space, priming will result. The arrangement of feed water, steam connections, safety valves, blow offs, gauge cocks, glasses, etc., is the same as in coal fired boilers. The entire heating surface is accessible for cleaning by means of easily removed cast iron shell heads, properly placed doors, etc., the ability to clean one of these boilers easily and quickly being most important.

Tubular waste heat boilers are either vertical or horizontal, the so-called "vertical" boiler having its tubes set at an angle of about 10 degrees from the vertical, and the tubes of the "horizontal" being inclined about 10 degrees from the horizontal.

In the vertical boiler, this is done to get better circulation, and to prevent the formation of steam pockets on the top crown sheet where the hottest gases enter; and in the horizontal boiler the tubes are inclined to give better circulation, to allow any liquid condensed from the gases to run toward the lower end of the tubes and out.

The vertical boilers handle blast gases only.

The horizontal boilers may be arranged for both blast and illuminating gases of a single set in the same boiler or in two boilers, one for blast and one for illuminating gases, or for recovery of heat from blast gases only.

Operation of Single Waste Heat Boiler for Both Gases.—This is the earliest successful type of waste heat boiler as applied to watergas sets.

The superheater stack valve, wash box and connection of the set are installed as usual. The boiler is connected to a second wash box, connected to the foul gas main via the regular scrubber. This is made like an ordinary wash box and comes into action when illuminating gas is being made and passed through the boiler.

A connection for admitting blast air to the inlet of the boiler is provided with each boiler. This tertiary air blast is used, when some combustible gases are leaving the superheater with the blast products.

With the boiler in operation, when the set is blasting, the superheater stack valve must be closed, the boiler stack valve open, the connection between superheater and boiler having the above mentioned ring in position between the flanges of the cut-off valve. The escaping products of combustion will then pass from the superheater, through the boiler and out. When the blow is finished, the set is put on the run in the usual way, except that the boiler stack valve is closed—the superheater stack valve being already closed. The valve on the outlet of the boiler wash box is kept open while the set is operating through the boiler, and the other wash box outlet shut.

When the boiler stack valve is closed, the set makes illuminating gas through the boiler and boiler wash box to the foul main via scrubber.

Starting with the boiler cold and filled with water to the proper level, and steam outlet valve closed, after a few blows and runs the pressure will begin to rise. When equal to the pressure in the rest of the steam system, the steam outlet valve can be opened, and the boiler will then supply steam to the works as would any other boiler. Water is fed to it from the feed water heater by pumps, or cold by injector. In small plants, the work of keeping the water at the proper level in the boiler falls usually to the gas maker, but in large plants, a water tender is generally employed.

There are a few points, however, which need careful watching. Whenever the boiler is to be put out of commission, even if the set also is shut down, the disc should at once be put in place in the boiler-superheater connection, cutting off the boiler from the set. If this is not done, hot air from the set may cause evaporation of water in the boiler, and result in a burnt boiler or in blowing off steam at the safety valve. The boiler cannot be regarded as shut down until the cut-off disc is in place.

If the inlet gas space of the boiler is higher than the boiler stack, there must be a 3-inch or 4 inch hole at the highest point, closed by a plug when the set is blasting or running through the boiler, and opened when the set is down. Otherwise it is possible for gas to collect in the space at the outlet end of the boiler when there is no flow through it, and explode there when the set starts up again.

Most important of all for economy and good steaming capacity is careful and regular observation of the temperature of the gases entering and leaving the boiler. In a well designed boiler, with the gases entering the boiler at the temperature of the superheater checker brick, say 1,350° F., their temperature leaving the boiler should not exceed 550° F., the boiler absorbing enough of the sensible heat from the gases to reduce the temperature of the whole volume by 800°. This will be pretty nearly the case in most installations for both gases when the boilers have just started off and sets and boilers are in normal working condition.

Under these conditions, assuming no CO in the escaping gases, allowing 2,300 cubic feet of escaping blast products per 1,000 cubic feet of illuminating gas made, it is possible to evaporate 43 to 44 pounds of water per 1,000 cubic feet gas made by sensible heat of blast gas, and with 16 pounds excess steam per 1,000 in the illuminating gas, it is possible to evaporate 30 to 31 pounds of water per 1,000 cubic feet by the sensible heat of the illuminating gas, or a total evaporation for the boiler of 73 to 75 pounds of water per 1,000 cubic feet of gas made by the set.

In the single type boiler for both gases, at about the beginning of the second 24 hours after the start, the temperature of the gases leaving the boiler has started to increase and on each succeeding day will continue to rise at an increasingly rapid rate. This is due to the fact that the blast gases, in their travel through the tubes, deposit some dust, and that the illuminating gases in their turn deposit some of their heaviest tar, the combination of dust and tar forming a tough pitchy deposit on the inner surface of the tubes, and retarding the flow of heat from the gases to the water. As a rise of 10 degrees in temperature of the escaping gases means a loss in evaporation of about 0.92 pound of water per 1,000 cubic feet gas made, it is evident that this fouling of the tubes cannot be allowed to go very far without serious loss in economy and capacity of the boiler. In a plant operating continuously, it is usually necessary to shut down and clean the deposit from the tubes and heating surfaces after about 7 days running, and all parts of the heating surface of such a boiler must be easily and quickly accessible. It is usual practice to shut down one of these boilers and clean it when the average temperature of the escaping gases reaches 700 to 750° F. The tubes are usually cleaned with some form of water turbine tube cleaner, as the deposit is of a very tough resisting nature.

They may also be cleaned by "burning out." This consists of igniting the pitchy matter in the tubes and supplying air blast until a large portion of the deposit is burned away or so changed that it will yield to the cutting action of the tube cleaner. During this burning out, the boiler makes steam at very rapid rate, but the set is out of commission.

This process occupies 1½ to 2 hours time, which is lost gas making time for the set.

During its progress, water must be sprayed over the cast iron heads and connections and stack of the boiler, which is done by spray pipes located within the heads and stack. It is necessary on account of the very high temperatures caused at these points by the burning carbon.

A boiler of this type of approximately 600-horse power (10 square feet heating surface = 1-horse power) will evaporate 24,000 pounds of water during one of these burnings which it would require about 3,000 pounds of coal to evaporate in a coal fire boiler.

Having finished burning out, the boiler is cut off from the set and allowed to cool off somewhat. Wherever possible, it should be cut out of the steam system and the pressure allowed to drop within it to 25 to 30 pounds gauge. The heads are then opened and the water turbine cleaner applied to the interior of the tubes to remove the remainder of the deposit. Work with the turbine should not be started until the pressure has dropped to 25 or 30 pounds, as with full pressure, if the turbine should rupture one of the tubes, the men might be burned.

This burning out saves at least 5/6 of the time which would be required to clean a dirty boiler.

In some plants, the practise of burning out the boiler every other day has been adopted with good results. While there is more lost gas making time on the set, it is possible to keep the average temperature of the gases leaving the boiler below 800° for about twice as long as is possible without it.

Another method in use in small plants for making tube cleaning easier, is to use the tertiary blast and burn some blue gas at the end of each regular blow at the inlet of the boiler, burning up some of the deposit immediately after its formation. After about 3 weeks, however, the stack temperatures are so high that the boiler must be shut down and cleaned. In this case about ¼ of tubes is cleaned each day with the turbine cleaner. This daily opening the boiler for cleaning would hardly apply to an installation of large boilers, as the cost of taking off and putting on of the large heads, etc., would be too great.

When the boiler is cleaned and closed up, the set must be stopped long enough to take out the cut-off disc and substitute the annular ring in the super-heater-boiler connection.

The set may then be started up and operated, the boiler being cut into the steam system when the steam pressure is sufficiently high.

Double Waste Heat Boiler (Both Gases.)—In this type, the blast gases are passed from the superheater of a single set through a comparatively large boiler, and the illuminating gases through a smaller boiler and separate wash box to the foul main. The steam spaces of the boilers are connected together and are practically one.

As only dust is carried along with the blast gases to the tubes of the blast gas boiler, no deposit is found there, except white ash which offers little resistance to the flow of heat through the tubes, and which can be removed easily with tube scraper and wire brush, and it is not necessary to clean the tubes except when the set is down for general overhaul. At such times it takes a very short while to clean them thoroughly. Consequently there is no lost gas making time and very little expense chargeable directly against the blast gas boiler. This illuminating gas boiler collects a pitchy deposit on its tubes which must be removed as often and in the same way as in the single boiler, with the set idle while burning out. When the burning out is complete, both boilers must be cut off from the set and also from steam system, and steam pressure reduced before the tubes of the illuminating gas boiler can be cleaned.

A large quantity of smoke is made by the single type boiler, when blast gases are passing through it, and while it is being burnt out. In the former case, the smoke is heavy and yellow and likely to drop small globules of tar close to the stack. In the latter case, it is dense and black and will carry a long way. Frequent burning out reduces this quantity considerably, but the smoke output of a boiler of this type makes its operation near the residential section of a city almost impossible.

The double boiler smokes much less than the single type, yellow smoke showing for only about a half minute after the blow starts, unless the checker brick of the carbureter are dirty or the oil spray is working poorly.

A small jet of steam admitted at the inlet of the blast gas boiler while the set is running, will decrease the amount of this smoke.

Vertical Tubular Waste Heat Boilers for Blast Gases Only.—In this type the blast gases leaving the superheater enter the boiler between the upper cast iron head and the top tube sheet, passing down through the tubes to a space between the bottom tube sheet and the bottom of the boiler shell, then up through a stack equipped with a stack valve and out. The stack must be of sufficient height to insure against a back draft when the generator is open for coaling or cleaning. The stack valve may be either on top of the stack or in a box-like enlargement of the stack at a convenient height above the operating floor. The box for the stack valve is fitted with doors of ample size for excess to the valve.

A tertiary air connection is provided at the inlet of the boiler for burning any CO which may leave the set with the products of combustion. A small jet of steam enters the inlet of this boiler when the set is making gas to prevent diffusion of illuminating gas into the boiler when the set is on the run.

As long as the stack valve is kept tight and the above described steam jet used, no illuminating gas can get into it, and consequently no tar is deposited in the tubes.

The cleaning of the tubes is simple, and need only be done when the set is down for routine overhaul. No smoke is thrown out by it during the blow.

Of course, an evaporation from and at 212 degrees of only 40 to 45 pounds of water per 1,000 cubic feet corrected illuminating gas made, is possible with it, because the sensible heat of the blast gases only is utilized. The simplicity of operation of these boilers and the absence of any form of trouble or nuisance connected with it make their installation a very attractive proposition for almost any works.

Water Tube Waste Heat Boilers.—This type uses the heat from the blast gas only, and is of the Babcock & Wilcox marine type with transverse drum. The connections between the boilers and set, and the method of controlling the flow of gases, are substantially different from the method used with tubular boilers. In one installation two water gas sets are connected to each 350 horse power boiler. In operation, they blast alternately, thus keeping a fairly steady flow of gases through the boiler. On the connection between each set and the boiler is a water sealed valve of special design, which is operated whenever the set to which it belongs changes from blow to run. An ingenious system of signal lights shows the gas maker the position of his own valve and also of the valve of the other set working on the same boiler.

The steel casing of this type of boiler is fitted with spring explosion doors and asbestos board explosion heads. These are necessary, as under certain circumstances an explosion may occur in the gas space of the boiler. For instance, if but one set is working on the boiler, and during the run there should be a leak on the boiler setting, air would be drawn in, displacing the products of combustion of the previous blow. At the end of the run, if the set purged out through the boiler, an explosive mixture might form and light within the shell of the boiler. This could also happen if one of the water sealed valves lost its seal.

These boilers are equipped with tar burning apparatus to be used when waste heat is not available.

When tar is used, it is fired from what in an ordinary boiler would be the front, when waste gases are in use they enter at the back.

When two sets are working on one boiler, an evaporation of about 40 pounds of water from and at 212° per 1,000 feet of gas corrected made by the sets is obtained and about rated capacity of the boiler.

Repairs.—Repairs on the boilers using illuminating gases are, of course, the heaviest, although the cost on any blast gas boilers is no heavier than on a coal fired boiler of the same size, running at the same capacity.

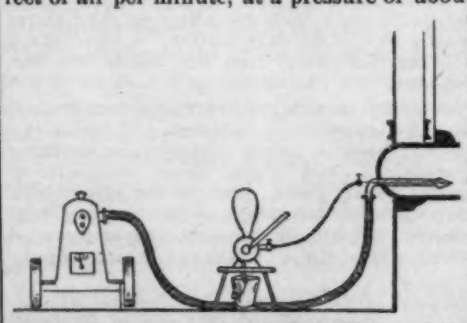
Saving.—A saving in boiler fuel of 7 to 8 pounds is shown by these boilers at various works, where heat of both gases is made use of, and 4 to 5 pounds where blast gas only is utilized.

The labor of cleaning and water tending on boilers for both gases will, however, a little more than offset the saving in coal and ash handling and fire room labor.

C. L. Bruff,
R. N. Davis,
P. T. Dashiell. } Committee.

New Methods and Appliances.

Rapid Scurfing of Retorts.—In a communication to the Belgian Gas Association, M. Schmidt described various methods of scurfing retorts including one used at the Louvain Gas Works. This appliance is a blower and 2-horse power engine, that delivers 700 cubic feet of air per minute, at a pressure of about 6 inches of water. The engine and blower combined occupy but 4 ft. by 3 ft., and can be easily moved about. When a retort is to be scurfed, the machine is drawn up near the setting, and an iron pipe from the outlet of the blower run into the retort to about half its length. The blower is then started, and about 2 hours are required to clear the retort. For a works having 10 settings of nine 10 foot retorts, M. Schmidt gave the cost of scurfing one setting as about $2.25, or $25 a year a bench. Notwithstanding that the greater part of the carbon is burnt, an appreciable quantity is saved for sale. Using the old method he gave the cost of scurfing as nearly double this figure. The great advantage of forced injection of air is that the works are able to make more gas owing to the fact that the retorts can be charged more rapidly, the capacity of this works being increased by about 3½ per cent.



Items of Interest
From Various Localities.

The Mead-Morrison Manufacturing Company, East Boston, Mass., has been awarded a contract by the Montreal Light, Heat and Power Company for the installing in the latter's Cote St. Paul works, of a complete coke handling plant, including bridge, etc. This is pretty good, stable evidence of how our Canadian gas brethren regard some of our specialties in construction; for the Mead-Morrison people have already done much important work in the Dominion.

Mr. Charles H. Nutting, whose proficient management of the South Shore Gas Company, of Babylon, Long Island, has earned from its proprietors high regard, has also been appointed General Manager of the Sea Cliff and Glen Cove and Patchogue Gas Companies, of Long Island. He will maintain his headquarters in Babylon. Of course, we take it for granted that all our readers know that Long Island is a very important section of New York.

"J. M." writing from Los Angeles under date of the 24th ult., incloses this mention: "Los Angeles has suffered lengthily and severely from 'Gas Rate-itis;' but, after many months of anguish, the tension has been temporarily relieved, and the people have been apprised that the distemper will not be rampant again until 30th of June, 1914. Then the trouble may reappear, for after the noted date the many Improvement Associations, the North, East, South and West Side Clubs, to say nothing of the Womens' Federation, will have further opportunity to add their expert testimony to that already available, at least to the point of establishing in their own minds the exact value of gas, in its various forms and proportions. The coming of natural gas has been the cause of the controversy, which coming has been both anticipated and delayed many months by the attempt to adjust a formula by the rate Doctors, who, strangely enough, in all these prescriptions have disregarded the value of B. T. U.'s. They (the latter) are no good. 'Tis gas we want' is their slogan. Accordingly the Public Service Commission did recommend,

and the City Council passed, the following schedule, to be in effect for 126 days: City proper, *artificial gas*, containing a 50 per cent. minimum of natural gas—maximum, not to exceed 60 per cent.—60 cents per 1,000; when delivered in San Pedro and Wilmington (American Coast towns) 90 cents per 1,000. *Natural gas* (original composition) city proper, 52 cents per 1,000; Coast towns, 82 cents per 1,000. *Artificial gas*, pure, city proper, 70 cents per 1,000; this rate was fixed June, 1913, and could not be changed; though a rate was proposed for the remainder of this year at 61.9 cents per 1,000. Any city needing the rate doctor's immediate services may readily find such in Los Angeles, for such adjusters will not be required there, at least until next June."

Mr. J. J. Boyle, since 1912 Superintendent of the Canisteo and Hornell (N. Y.) Gas Light Company, has been appointed Superintendent of the Homer and Cortland (N. Y.) Gas Company. He assumed charge the first inst.

"On the 26th ult. the Public Service Commission, of Missouri, authorized the proprietors of the Laclede Gas Light Company, of St. Louis, to issue $5,000,000 par, 5-year, 5 per cent. notes, with the understanding that the sum received from such sale shall be thus apportioned: On account equipment of coke ovens, $826,000; to reimburse the treasury $1,569,418.11, as and for past construction work; to the Southerm Improvement and Manufacturing Company, $452,000, on account of purchase of site.—R. W. P."

"A. L. S.," writing from Missoula, Mont., under date of the 25th ult., sends this: "Some days ago, Manager Plank, of the Missoula Gas Company, sat in state, in its up-to-date new headquarters, in West Main street, not far from the Missoulian Building. The gas folks certainly have gotten up a most interesting display of appliances, the collection including ranges, cookers, hot water heaters, lamps, burners, fixtures—some of these of the Bayley type are certainly not only useful, but artistic as well. Your informant, in a pleasant interview with the urbane Manager, was told: 'We shall have a complete demonstration room here as soon as we get thoroughly settled. And we want all our friends to visit us at their pleasure. The oftener they come the heartier will be their welcome, since nothing else equals frequent getting together for the benefit of all. Of course, we can carry on demonstrations here with greater facility and force than in the individual homes. We have a comfortable lounging room for the ladies, the room being equipped with a telephone, a writing table, appropriate stationery, and the like. Our belief is that shoppers will appreciate this action of ours.'"

"M. B. M.," writing from Fort Wayne, Ind., under date of February 28th, says: "Likely you have had advices respecting this matter, but I send a detail or so of the transaction that may be of use. Some days ago the Indiana Light and Fuel Company, financed by Fort Wayne capital, and operating artificial gas plants in Kendalville, Garret and Auburn, Ind., disposed of its properties to Michigan capitalists. The new owners (retaining the corporate name) were represented by Messrs. C. A. and A. C. Runyan, South Haven, Mich.; and L. F. Ryall, who operate the Companies in South Haven, Allegan County and Sturgis. The old Company had been involved in a contention regarding the matter of reducing the gas rate from $1.25 per 1,000 to $1 per 1,000, not long ago announced its purpose to surrender its franchise, and thereafter operate under the regulations of the State Public Service Commission."

In connection with the above we might also say that the reorganization resulted in the following executive selections: Directors, L. F. Ryall, Hugh G. Keegan—his connection with the Company is understood to be temporary—C. A. Runyan, E. D. Ryall and A. C. Runyan; President, General Manager and Treasurer, L. F. Ryall; Secretary, H. G. Keegan. The Indiana Light and Fuel Company was organized in Fort Wayne, June, 1909, with a capital stock of $200,000 preferred and $150,000 common, the incorporators being Messrs. O. N. Guldlin, Charles McCulloch, F. V. Culbertson, Geo. Beers and Hugh G. Keegan.

"Mr. William M. Eaton, the first General Manager of the Rochester (N. Y.) Railway and Light Company, later on connected prominently with Messrs. Hodenpyl, Walbridge & Co., of New York, and later on a factor in the firm of of Hodenpyl, Hardy & Co., has purchased a 10 acre tract, on the outskirts of Jackson, Mich., where he is anxiously awaiting the advent of spring, so that he may try his somewhat 'prentice hand at farming. 'Tom' Moran, of Battle Creek, I am told, advises him to try sweet peas, as a starter, but the only Lynn is of the opinion that, owing to his general sweetness of disposition, melons would be nearer the mark. Then, again, Blauvelt believes that, noting Mr. Eaton's speedy ways, a few good brood mares would find great pasturing on the aforesaid broad acres. However, it is likely that the type of farming to be eventually selected will not be determined until 'Al.' Eaton, of Chicago, is consulted. However, you'll all be glad to know that his farm venture does not mean his retirement altogether from the gas field, wherein he has assiduously and successfully labored these many years!—Americus."

Not many evenings ago the women employees of the Cambridge (Mass.) Gas Light Company, shared in a fancy dress ball, the assembly room being the large apartment or hall in the third story of the Company's model headquarters. Some of the costumings, although a trifle modern, were, as a participator remarked, quite attracting. Miss Grace Whitten was an admirable pianist, and the close of the dance was nicely marked by a satisfying luncheon.

The Taylor-Hornsby Construction Company, Inc., has opened a general office in the *Post-Standard* Building, Syracuse, N. Y., wherefrom to conduct a general contracting business. Mr. Taylor, who retires from the American Steel Foundries corporation to take up this new field, will be known to the gas industry from his connection in an engineering capacity with the United Gas Improvement Company, in the reconstruction of the Syracuse Lighting Company's plants and the sub-station at Solvay.

At the annual meeting of the shareholders in the Dayton (O.) Gas Company, these officers were elected: Directors, E. W. Hanley, C. B. Oglesby, Joseph H. Light, B. F. Wandler, R. R. Dickey, G. H. Wood, W. D. Graves, W. B. Gebhart and A. C. Dickey; President, E. W. Hanley; Vice President, C. B. Oglesby; Treasurer and Secretary, B. F. Wendler; Asst. Treasurer and Secretary, W. B. Gebhart.

At a recent meeting of the City Council, of Fairbault, Minn., an ordinance was carried which directs the Consumers' Power Company to charge not to exceed $1 per 1,000 cubic feet for gas supplied by it. The ordinance is to become operative the first prox. The "measure" also contains the following * * * "And shall be of the pressure, purity, candle power, or heating value, and shall comply with the latest requirements and notifications of the Gas Referees, covering Metropolis Gas, London, England." The quoted ending is an exact reproduction of the wording of a portion of Section 1 of the ordinance. What may it be taken to mean?

Mr. Henry Pratt, President of the Henry Pratt Company, a Chicago concern well and widely known in the steel construction world, died at his home, 815 West Garfield Boulevard, Chicago, the morning of the 27th ult. Mr. Pratt was born in Fort Wayne, Ind., March 25, 1844, and when in his 28th year entered the service of the Peoples Gas Light and Coke Company, Chicago, eventually becoming its Superintendent. In the '80's he became interested in steel construction, his first work of magnitude in that line being the steel tube in the La Salle street tunnel. He was also prominent in the construction of that splendid piece of engineering, the Michigan Central Railroad's tunnel under the Detroit river to Detroit city. He is survived by his wife.

The new storage holder for the Rochester (N. Y.) Railway and Light Company, having a capacity of six millions cubic feet, was satisfactorily put into active working the last week in February.

The St. Clair County Gas Company, of East St. Louis, Ills., is planning to erect an office building on a site at the junction of Fifth street and Missouri avenue. The estimated cost of the structure is returned at $125,000.

The City Council of Cincinnati, O., has approved a resolution asking the Ohio Public Service Commission to make an examination and physical valuation of the properties of the Union Gas and Electric Company, to the end that the city authorities may have a better idea as to what fair and equitable rates for service should be.

Utilities Commission News.

CLASSIFICATION OF SERVICE.—The owner of a garage was placed in the manufacturers' class for the determination of a proper charge for gas used by him in generating electric current, in a decision of the Supreme Court of Louisiana.

The Shreveport Gas, Electric Light and Power Company, had established three classes, domestic consumption, public institutions and manufacturers, and had originally placed the plaintiff in the domestic consumption class.

ADEQUACY AND QUALITY OF GAS.—The California Commission in the case of the City of Huntington Beach vs. West Coast Gas, Light and Fuel Company, after consideration of complaint of inadequate and insufficient service, ordered defendant to install within 90 days an additional 100,000 cubic feet generating unit; also by May, 1915, if conditions warrant, a container of not less than 40,000 cubic feet capacity, and that tests for quality be conducted at stated periods. Evidence showed periodic total failures of supply and partial failures, inadequate reserve capacity, etc. The conditions specified in the order are that the additional holder shall be put in if the delivery of gas increases during the next 12 months at the same or greater rate than during the past 12.

METER DEPOSITS ALLOWED.—The New Jersey Commission in ruling on complaints against the Easton Gas Company and the Eastern Pennsylvania Power Company of New Jersey, has decided that the exaction of an advance deposit in proper amount is not unreasonable, even where a pre-payment meter is set.

"Considerations requiring a utility to serve all applicants seem to establish the reasonableness of a rule which a utility may impose requiring of its customers advance deposits to secure bills for service to be rendered. The limitations upon such a rule are evident. The deposit exacted may not be excessive or exorbitant. Otherwise, the exaction of such a deposit might operate to destroy the universal obligation to serve any and all would-be consumers entitled to service. The deposits also must not be unduly or unjustly discriminatory, for the simple reason that such discrimination is unlawful for public utilities. The deposits also in the aggregate, and to the extent not used to liquidate consumers' bills justly due, must be treated as a quasi-trust fund."

The complaint is dismissed without prejudice to the right of any consumer, who demonstrates by his prompt payment for a reasonable period his financial responsibility, to petition for exemption from the operation of the rule imposing the prepayment.

NEW YORK APPOINTMENT.—Mr. Seymour Van Santvoord, Troy, N. Y., has been nominated by Governor Glynn to be a member of the New York Public Service Commission, Second District, to succeed Mr. Frank W. Stevens, whose term expired a year ago. Mr. Van Santvoord is a lawyer, has been prominent as a banker and was one of the organizers of the Trust Companies' Association of New York State.

PHYSICAL VALUATION COURSE AT HARVARD.—A course which deals with physical valuation of public service corporations, including railroads, waterworks, gas and electric plants, etc., has been established at Harvard University, School of Engineering, under Professor George F. Swain, Gordon McKay, professor of civil engineering.

The principals apply to the appraisals of any industrial property, whether a public utility or not, as, for instance, the valuation of industrial plants in connection with the issuance of securities. The problem is treated in its broadest aspects, and the historical development of the subject is outlined. A careful study is made of the various elements of the problem, such as original cost, depreciation, deferred returns, market value, going value and other intangible values, obsolescence, etc., and reference is made to the reports of public service commissions dealing with this subject in various States.

In addition to this course, others bearing on the subject of public service corporations are offered in the Harvard School of Busines Administration.

The Market FOR GAS SECURITIES.

There is nothing of interest to be noted in connection with the city gas share market for the week. The prevailing features were listlessness and weakness, the quotation for Consolidated this morning (Friday) being 133½ to 134½. The output for February was a remarkable one, but it was not an unalloyed joy, in that the severe weather conditions resulted in quite a bit of damage to the distributing end.

Brooklyn Union fairly well maintains its recent quotations, which is not to be wondered at, considering that these fare far below representing even the physical value of the property.

Other out of-town shares are dull, although prices are at a fair average, considering the uncertainty that seems rampant in connection with all sorts of investments.

The output of the Boston Consolidated Company showed a gain of 3.9 per cent. for February. The Columbus (Ohio) Company has declared a quarterly of 1¾ on the preferred, payable (in scrip) the 16th inst. The United Gas and Electric Corporation's semi-annual of 3 is payable the first prox., and the Blackstone Valley (R. I.) Gas and Electric Company's quarterly of 2 was paid the 2d inst.

We understand that an offer of $160 per share has been made for the minority holdings in the Georgetown (D. C.) Company or $5 per share more than the figures agreed upon for the controlling block. The showing made by the Providence Gas Company, in the fiscal year closed December 31, 1913, was by far the greatest in its history. The bond market continues good.

GAS STOCKS.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

MARCH 9.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$99,816,500	100	133⅛	134⅛
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	8,500,000	1,000	101	103
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	101	104
Mutual Gas Co.	3,600,000	100	157	157
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	99	101
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	59	62
1st Mtg. Gold Bds. 5 p. ct.	1,500,000	—	98¼	100¼
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	98	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	100	102
Standard	5,000,000	100	102	104
Preferred	5,000,000	100	93	94
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	93	95
The Brooklyn Union	15,000,000	1,000	125½	127½
1st Con. 5's, due 1948, M. & N.	15,000,000	—	102	103
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	3	5
Bonds, 5's	5,250,000	1,000	59	60
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,500,000	1,000	104	106¼
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	94	96
Bonds	75,000	—	—	100
Consolidated, Baltimore	13,460,084		118¾	119
Mortgages, 5's	3,400,000		—	—
General Mortgage 4½	10,661,000		—	—
Con. Gas Co., Baltimore City, 4½	2,751,000		—	—
Cincinnati Gas and Electric Co.	29,500,000	100	17	20
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus Gas Light & Fuel Company	1,682,750	100	65¾	66¼
Preferred	3,026,500	100	33	35¾
Detroit Gas Co., 5's	381,000	1,000	75	80
" Prior Lien 5's	5,619,000	1,000	97	100¼
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	132	136
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Laclede Gas Co., St. Louis.	10,000,000	100	97	100
Preferred	2,500,000	100	—	102¾
Bonds	10,000,000	1,000	102¾	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	120	130
Massachusetts Gas Companies, of Boston	25,000,000	100	93¾	94¾
Preferred	25,000,000	100	94	95¾
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	
Montreal L. H.& P., Canada	9,000,000	100	228	240
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	5,000,000	25	189	190
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	121¾	122
1st Mortgage	20,100,000	1,000	103	103¼
2d "	2,500,000	1,000	104	—
Pacific Gas and Electric Co.	15,500,000	—	45¾	45¾
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	105
Extension, 6's	600,000	1,000	112¾	115
General Mortgage, 5's	3,447,000	1,000	94	96
United Gas Imp. Co.	55,502,940	50	168	171
Washington (D. C.) Gas Co.	1,600,000	200	440	442
Western Gas Co., Milwaukee	4,000,000	—	—	—